

REMARKS

Status of Application

Entry of this response and reconsideration and allowance of the above-identified patent application are respectfully requested. Claims 1-9 and 11 were rejected in the office action. Claims 1 and 6 have been amended. Therefore, following entry of the present response, claims 1-9 and 11 will remain pending in the present application.

Applicant also acknowledges with appreciation the Examiner's the informal telephone conference of August 15, 2005, during which the Examiner provided clarification of the present claim rejections.

Objection to the Drawings

FIGs. 2 and 3 are objected to for not including a legend such as – Prior Art – because only that which is old is illustrated. Without comment on the propriety of the objection, Applicant has amended FIGs. 2 and 3 and therefore respectfully requests withdrawal of the outstanding objection.

Objections to the Specification

Equation (8) in the specification is objected to for allegedly being incorrect. Namely, the Examiner states that equation (8) is incorrect “because it mixes time domain with frequency domain.” Applicant has made explicit an intermediate step that previously was implicit in the derivation of equation (8). As such, the relationship between the time- and frequency-domain functions in equation (8) is made more clear. As the rewritten equation (8) is merely a clarified restatement of the previous claim (8), no new matter has been added by this amendment. Accordingly, Applicant respectfully requests withdrawal of the objection to equation (8).

Equation (17) in the specification is objected to for containing an extra right parenthesis. Applicant has corrected this typographical error and therefore requests withdrawal of the objection to equation (17).

The Office Action objects to the incorporation by reference of “essential material” described in the patent specification. Office Action at pp. 2-3. Applicant respectfully submits

that the cited references are not essential material. For example, with reference to steps (b) and (d) of claim 1, the specification in the as-filed application recites that the references contain “similar [*i.e.*, exemplary] technique[s].” Thus, the references are included as a convenience to one skilled in the art. Regarding step (e), the specification excerpts equation (18) and the relationship $L=N^2/\mathcal{R}$, thereby providing a skilled artisan with adequate information to perform step (e) without need for the cited reference. Accordingly, Applicant respectfully requests withdrawal of the objection to the specification.

Claim Objections

Claim 1 is objected to because the equation recited in recited at step c) contains an extra right parenthesis. Applicant has corrected this typographical error and therefore requests withdrawal of the objection to claim 1.

Claim Rejection – 35 U.S.C. §112, First Paragraph

Claims 1-9 and 11 stand rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement. Specifically, the Examiner asserts that the specification’s incorporation by reference of “essential material” fails to comply with the enablement requirement of §112, first paragraph. For the reasons discussed above in connection with Applicant’s response to the Office Action’s objection to the specification, Applicant respectfully submits that the cited references are not essential material and requests that the rejection of claims 1-9 and 11 under 35 U.S.C. §112, first paragraph be withdrawn.

Claim Rejection – 35 U.S.C. §112, First Paragraph

Claim 6 stands rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant has amended claim 6 to recite “steps a-e,” and therefore respectfully request that the rejection of claim 6 under 35 U.S.C. §112, second paragraph be withdrawn.

Double Patenting Rejection

Claim 1 stands rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claim 2 of U.S. Pat. No. 6,527,695 B1

("Davey 1"), in view of Ruohonen, "Transcranial Magnetic Stimulation: Modeling and New Techniques," Doctoral Thesis, Department of Engineering Physics and Mathematics, Helsinki University of Technology, 1998, pp. 1-50 ("Ruohonen"). Applicant respectfully submits that Ruohonen fails to cure the deficiencies of Davey 1 and, as a result, Claim 1 is not obvious in view of Davey 1 and/or Ruohonen, either taken alone or in combination.

For example, claim 1 recites:

1. (Amended) A computerized method of optimizing properties of a magnetic core, the core having inner and outer radii and windings, the computerized method having computer-executable instructions for performing the following:

a) allowing the inner and outer core radii to change parametrically in a nested loop;

b) *computing core reluctance, number of turns, and winding resistance for each position;*

c) computing a maximum induced membrane voltage based on the following equation:

$$V_m(t) = f \sqrt{\frac{2W}{\Re}} \omega \tau_L (4\omega^2 \tau_L^2 - 1) \cdot \frac{\left(e^{-\frac{t}{2\tau_L}} \cos(\beta) + \frac{e^{-\frac{t}{2\tau_L}} (2\tau_L \tau_m \omega^2 - 1) \sin(\beta)}{\sqrt{4\omega^2 \tau_L^2 - 1}} - e^{-\frac{t}{\tau_m}} \right)}{4\omega^4 \tau_m^2 \tau_L^3 + \omega^2 (4\tau_L^3 - \tau_m^2 \tau_L) + (\tau_m - \tau_L)};$$

$$\text{where } \beta \equiv \frac{1}{2} \sqrt{\frac{4\omega^2 \tau_L^2 - 1}{\tau_L^2}} t.$$

d) *fitting the maximum induced membrane voltage to the inner and outer core radii using a multi-variable spline analysis;* and

e) using a variable metric sequential quadratic program algorithm to compute a value for the inner and outer core radii that maximizes the maximum induced membrane voltage.

(Emphasis added). Applicant first notes that in the previous Office Action (dated August 2, 2004) the Examiner rejected claims 1-10 under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over Davey 1 alone. The

Examiner found Applicant's arguments against the rejection in the Response dated February 2, 2005 to be persuasive and withdrew the rejection. Office Action at p. 11. Applicant's arguments pointed out that Davey 1 is directed to a method for stimulating a nerve cell whereas the claimed invention is directed to optimizing a magnetic core through various considerations not contemplated by Davey 1. For example, the claimed invention recites allowing the core radii to change parametrically in a nested loop, while the core's reluctance, number of turns and winding resistance are calculated for each position. Because the Examiner has withdrawn the obviousness-type double patenting rejection of claims 1-10 based on Davey 1 alone, Applicant assumes herein that the Examiner has acknowledged that Davey 1 does not teach or suggest these claimed features.

The Examiner points to p. 23 of Ruohonen as disclosing "modeling TMS and using the developed models as a basis for engineering modifications that would increase the utility of TMS." Office Action at p. 8. Specifically, the Examiner refers to the following statements on p. 23 of Ruohonen: "[c]oil design must always be taken into account when constructing TMS equipment," "[i]n one study, a mathematical method was used to maximize the focality by changing the coil shape," and "[p]roblems with power consumption and coil heating can be alleviated by reducing the coil's resistance, determined by the wire gauge and coil geometry." See Office Action at pp. 8-9. Applicant respectfully submits that Ruohonen fails to cure the deficiencies of Davey 1 because Ruohonen also fails to teach or suggest the claimed methods for optimizing a magnetic core.

Ruohonen merely provides some suggested core features or characteristics that might need to be taken into account. Ruohonen fails to teach or suggest: "allowing the inner and outer core radii to change parametrically in a nested loop" or "computing core reluctance, number of turns, and winding resistance for each position" as claimed. The statement that "[c]oil design must always be taken into account when constructing TMS equipment" merely teaches what should be apparent: one cannot construct TMS equipment haphazardly, without regard for coil design. But making a general statement about coil design and providing a few generic examples does not teach a skilled artisan all conceivable methods for carrying out such a design. In other words, the mere suggestion to make *some* modification to the coil would hardly provide a skilled artisan with sufficient motivation to make *the claimed*

modifications to a coil. *See* M.P.E.P. §§706.02(j), 2144. Thus, even if the teachings of Davey 1 and Ruohonen were combined, they would not teach or suggest the claimed invention to a skilled artisan.

Accordingly, Applicant respectfully requests that the rejection of claim 1 under the judicially created doctrine of obviousness-type double patenting be withdrawn.

Claim Rejection – 35 U.S.C. §102(b)

Claim 11 stands rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Pat. No. 5,725,471 (“Davey 2”). Applicant respectfully traverses the rejection of claim 11 and, in any event, submits that the rejection of dependent claim 11 under 35 U.S.C. §102(b) is improper. Specifically, claim 11 depends on claim 1, which the Examiner has rejected under 35 U.S.C. §103(a). As recited in 37 C.F.R. §1.75: “[c]laims in dependent form shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim.” *See also* M.P.E.P. §608.01(i). Thus, to properly reject a dependent claim under 35 U.S.C. §102(b), the Examiner must find a reference that teaches all of the limitations of the dependent claim *and of any claims from which the dependent claim depends*. *See* M.P.E.P. §706.02 (IV).

The Office Action has not pointed to any teaching in Davey 2 that corresponds to the features of claim 1 and has not disclosed any reason for combining the teachings of Davey 2 with those of the references used to reject claim 1. Accordingly, Applicant respectfully requests that the rejection of claim 11 under 35 U.S.C. §102(b) be withdrawn.

Claim Rejection – 35 U.S.C. §103(a)

Claims 1-9 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Davey 1 in view of Ruohonen, “Transcranial Magnetic Stimulation: Modeling and New Techniques,” Doctoral Thesis, Department of Engineering Physics and Mathematics, Helsinki University of Technology, 1998, pp. 1-50 (“Ruohonen”). Applicant respectfully submits that Davey 1 and/or Ruohonen, either taken alone or in combination, fail to teach or suggest the subject matter of claims 1-9 for the reasons discussed above in connection with the present Reply’s discussion of the obviousness-type double patenting rejection.

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**PATENT
REPLY FILED UNDER EXPEDITED
PROCEDURE PURSUANT TO
37 CFR § 1.116**

Accordingly, Applicant respectfully requests that the rejection of claims 1-9 under 35 U.S.C. §103(a) be withdrawn.

CONCLUSION

In view of the foregoing, applicants respectfully submit that the claims are allowable and that the present application is in condition for allowance. Reconsideration of the application and an early Notice of Allowance are respectfully requested. In the event that the Examiner cannot allow the present application for any reason, the Examiner is encouraged to contact the undersigned attorney, Christos A. Ioannidi at (215) 564-8994, to discuss resolution of any remaining issues.

Respectfully submitted,

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